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## THE COUNTRY OF THE SHEPHERDS\*

By ISAIAH BOWMAN

The lofty mountain zones of Peru, the high bordering valleys, and the belts of rolling plateau between are occupied by a race of shepherds. In that cold, inhospitable region at the top of the country are the highest permanent habitations in the world (17,100 feet), the loftiest pastures, the greatest degree of adaptation to combined altitude and frost. It is here only a step from Greenland to Arcady. Nevertheless it is Greenland that has the people. Why do they shun Arcady? To the traveler from the highlands the fertile valleys between 5,000 and 8,000 feet seem like the abode of friendly spirits to whose charm the highland dweller must yield. Every pack-train from valley to highland carries luxury in the form of fruit, coca, cacao, and sugar. One would think that every importation of valley products would be followed by a wave of migration from highland to valley. On the contrary the highland people have clung to their lofty pastures for unnumbered centuries. Until the Conquest the last outposts of the Incas toward the east were the grassy ridges that terminate a few thousand feet below the timber line.

In this natural grouping of the people where does choice or blind prejudice or instinct leave off? Where does necessity begin? There are answers to most of these questions to be found in the broad field of geographic comparison. But before we begin comparisons we must study the individual facts upon which they rest. These facts are of almost every conceivable variety. They range in importance from a humble shepherd's stone corral on a mountain slope to a thickly settled mountain basin. Their interpretation is to be sought now in the soil of rich playa lands, now in the fixed climatic zones and rugged relief of deeply dissected, lofty highlands in the tropics. Some of the controlling factors are historical, others economic; still other factors have exerted their influence through obscure psychologic channels almost impossible to trace. The *why* of man's distribution over the earth is one of the most complicated problems in natural science, and the solution of it is the chief problem of the modern geographer.

At first sight the mountain people of the Peruvian Andes seem to be uniform in character and in mode of life. The traveler's first impression is that the same stone-walled, straw-thatched type of hut is to be found everywhere, the same semi-nomadic life, the same degrees of poverty and filth. Yet after a little study the diversity of their lives is seen to be, if not a dominating fact, at least one of surprising importance. Side by side

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\*A chapter from a book entitled "The Andes of Southern Peru" to be published by the American Geographical Society in 1916. Part of the work of the Yale Peruvian Expedition of 1911.

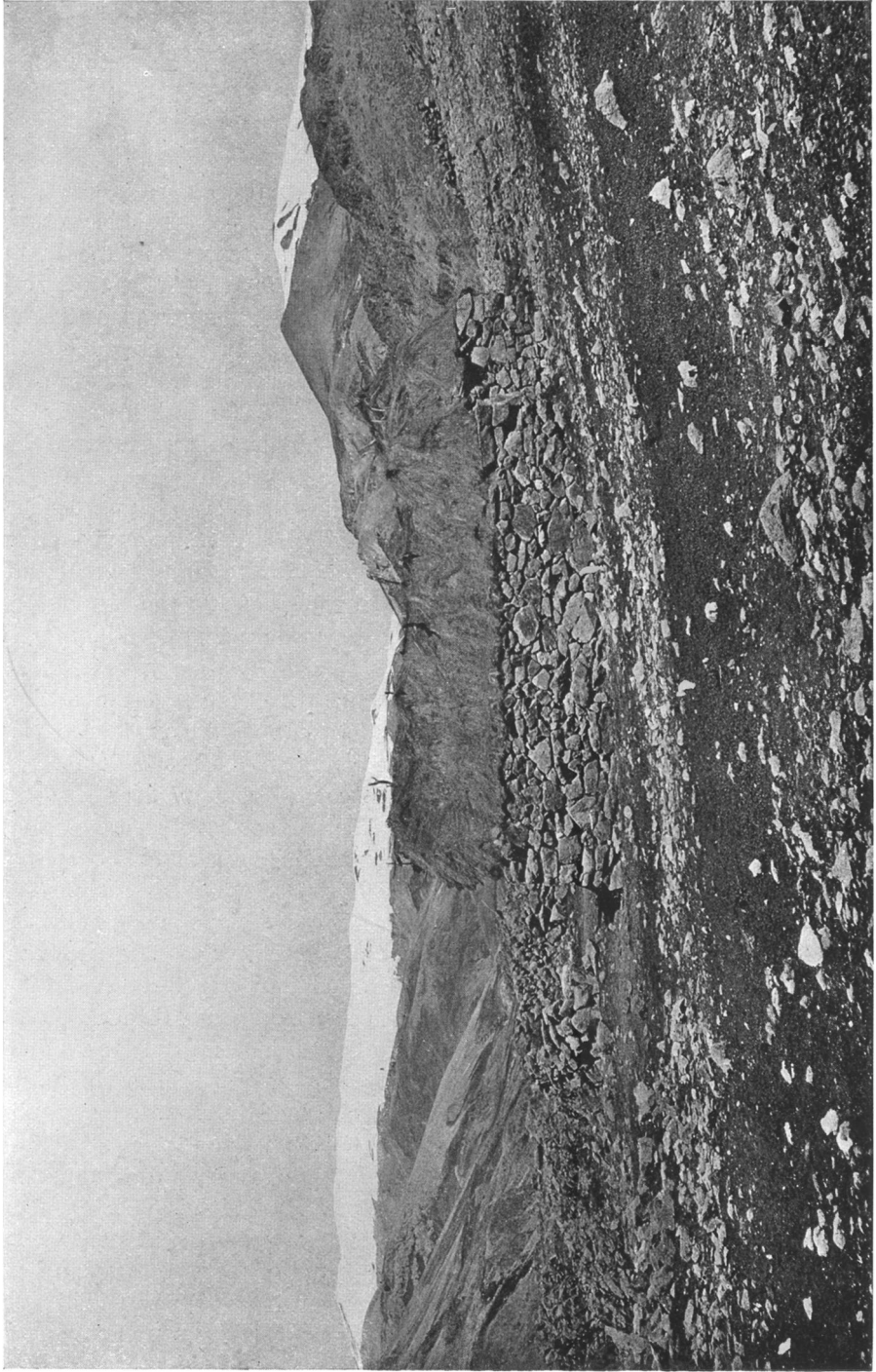


FIG. 1—This stone hut, grass-thatched, is the highest permanent habitation in Peru, and it is believed to be the highest in the world. Altitude of 17,100 feet determined by instrumental survey. The topographic map showing details of the region is to be published in the final report. For location, see Fig. 2.

with this diversity there runs a corresponding diversity of relations to their physical environment. Nowhere else on the earth are greater physical contrasts compressed within such small spaces. If, therefore, we accept the fundamental theory of geography that there is a general, necessary, varied, and complex relation between man and the earth, that theory ought here to find a really vast number of illustrations. A glance at the accompanying figures discloses the wide range of relief in the Peruvian Andes. The corresponding range in climate and in life therefore furnishes an ample field for the application of the laws of human distribution.

In analyzing the facts of distribution we shall do well to begin with the causes and effects of migration. Primitive man is in no small degree a wanderer: His small resources often require him to explore large tracts. As population increases the food quest becomes more intense, and thus there come about repeated emigrations which increase the food supply, extend its variety, and draw the pioneers at last into contact with neighboring groups. The farther back we go in the history of the race the clearer it becomes that migrations lie at the root of much of human development. The raid for plunder, women, food, beasts, is a persistent feature of the life of those primitive men who live on the border of unlike regions.

The shepherd of the highland and the forest hunter of the plains perforce range over vast tracts, and each brings back to the home group news that confirms the tribal choice of habitation or sets it in motion toward a more desirable place. Superstitions may lead to flight akin to migration. Epidemics may be interpreted as the work of a malignant spirit from which men must flee. War may drive a defeated group into the fastnesses of a mountain forest where pursuit by stream or trail weakens the pursuer and confines his action, thereby limiting his power. Floods may come and destroy the cultivated spots. Want or mere desire in a hundred forms may lead to movement.

Even among forest tribes long stationary the facile canoe and the light household necessities may easily enable trivial causes to develop the spirit of restlessness. Pressure of population is a powerful but not a general cause of movement. It may affect the settled groups of the desert oases, or the dense population of fertile plains that are rooted in the soil. On the other hand mere whims may start a nomadic group toward a new goal. Often the goal is elusive and the tribe turns back to the old haunts or perishes in the shock of unexpected conflict.

In the case of both primitive societies and those of a higher order the causes and the results of migration are often contradictory. These will depend on the state of civilization and the extremes of circumstance. When the desert blooms the farmers of the Piura Valley in northwestern Peru turn shepherd and drive their flocks of sheep and goats out into the short-lived pastures of the great pampa on the west. In dry years they send them eastward into the mountains. The forest Indian of the lower Uru-

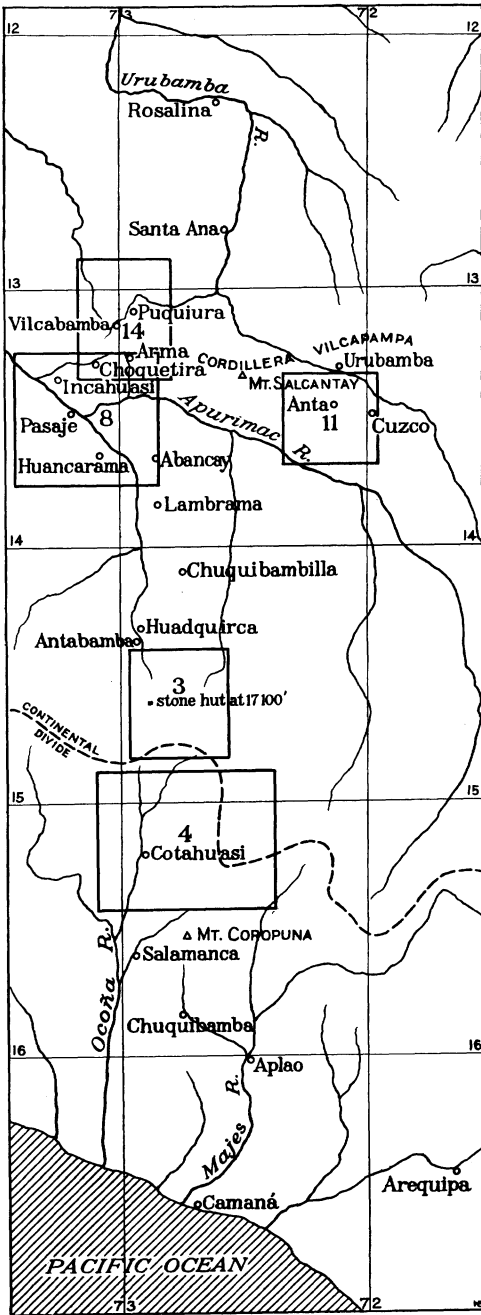


FIG. 2.—Outline map of a part of the Andes of southern Peru showing the location of the regional diagrams and of the names mentioned in the text. Scale, 1:3,300,000. The large numbers in the rectangles correspond with the figure numbers.

bamba is a fisherman while the river is low and lives in a reed hut beside his cultivated patch of cane and yuca. When the floods come he is driven to the higher ground in the hills where he has another cultivated patch of land and a rude shelter. To be sure, these are seasonal migrations, yet through them the country becomes better known to each new generation of men. And each generation supplies its pioneers, who drift into the remoter places where population is scarce or wanting altogether.

Dry years and extremely dry years may have opposite effects. When moderate dryness prevails the results may be enduring. The oases become crowded with men and beasts just when they can ill afford to support them. The alfalfa meadows become overstocked, and cattle become lean and almost worthless. But there is at least bare subsistence. By contrast, if extreme and prolonged drought prevails, some of the people are driven forth to more favored spots. At ValLENar in central Chile, some of the workmen in extreme years go up to the nitrate pampa; in wet years they return. When the agents of the nitrate companies hear of hard times in a desert valley they offer employment to the stricken people. It not infrequently happens that when there are droughts in desert Chile there are abundant rains in Argentina on the other side of the Cordillera. There has

therefore been for many generations an irregular and slight, though definite, shifting of population from one side of the mountains to the other as periods of drought and periods of rain alternated in the two regions. Some think there is satisfactory evidence to prove that a number of the great Mongolian emigrations took place in wet years when pasture was abundant and when the pastoral nomad found it easy to travel. On the other hand it has been urged that the cause of many emigrations was prolonged periods of drought when the choice lay between starvation and flight. It is evident from the foregoing that both views may be correct in spite of the fact that identical effects are attributed to opposite causes.

It is still an open question whether security or insecurity is more favorable for the broad distribution of the Peruvian Indians of the mountain zone which form the subject of this paper. Certainly both tend to make the remoter places better known. Tradition has it that, in the days of intertribal conflict before the Conquest, fugitives fled into the high mountain pastures and lived in hidden places and in caves. Life was insecure and relief was sought in flight. On the other hand peace has brought security to life. The trails are now safe. A shepherd may drive his flock anywhere. He no longer has any one to fear in his search for new pastures. It would perhaps be safe to conclude that there is equally broad distribution of men in the mountain pastures in time of peace and in time of war. There is, however, a difference in the kind of distribution. In time of peace the individual is safe anywhere; in time of unrest he is safe only when isolated and virtually concealed. By contrast, the group living near the trails is scattered by plundering bands and war parties. The remote and isolated group may successfully oppose the smaller band and the individuals that might reach the remoter regions. The fugitive group would have nothing to fear from large bands, for the limited food supply would inevitably cause these to disintegrate upon leaving the main routes of travel. Probably the fullest exploration of the mountain pastures has resulted from the alternation of peace and war. The opposite conditions which these establish foster both kinds of distribution; hence both the remote group life encouraged by war and the individual's lack of restraint in time of peace are probably in large part responsible for the present widespread occupation of the Peruvian mountains.

The loftiest habitation in the world (Fig. 1) is in Peru. Between Antabamba and Cotahuasi occur the highest passes in the Maritime Cordillera. We crossed at 17,400 feet, and three hundred feet lower is the last outpost of the Indian shepherds. The snowline, very steeply canted away from the sun, is between 17,200 and 17,600 feet. At frequent intervals during the three months of winter, snowfalls during the night and terrific hailstorms in the late afternoon drive both shepherds and flocks to the shelter of leeward slopes or steep canyon walls. At our six camps, between 16,000 and 17,200 feet in September, 1911, the minimum temperature

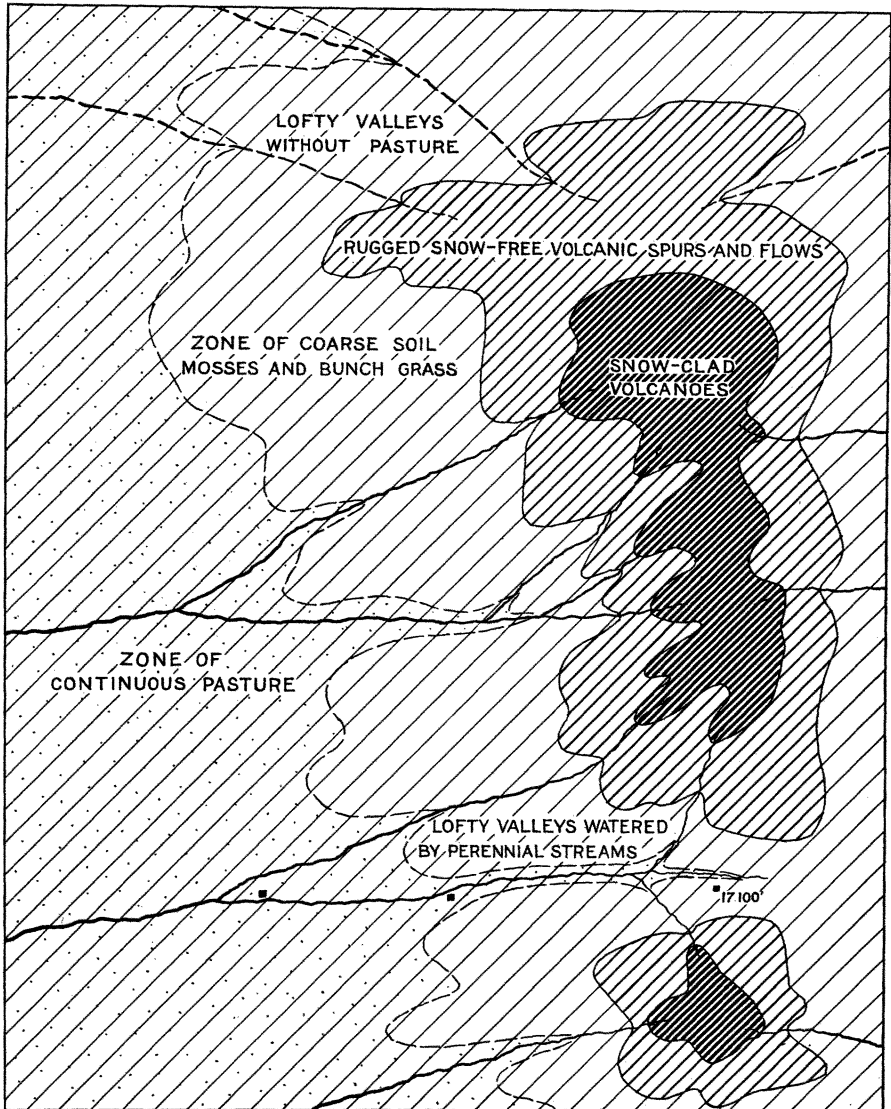


FIG. 3.—Regional diagram for the Maritime Cordillera to show the physical relations in the district where the highest habitations in the world are located. For location, see Fig. 2. It should be remembered that the orientation of these diagrams is generalized. By reference to Fig. 2 it will be seen that some portions of the crest of the Maritime Cordillera run east and west and others north and south. The same is true of the Cordillera Vilcapampa, Fig. 14.

*Note on regional diagrams.*—For the sake of clearness I have classified the accompanying facts of human distribution in the country of the shepherds and represented them graphically in "regional" diagrams, Figs. 3, 4, 8, 11, and 14. Because they are presented here for the first time a word of explanation is desirable. They are constructed on the principle of dominant control. Each brings out the factors of greatest importance in the distribution of the people in a given region. Furthermore, the facts are compressed within the limits of a small rectangle. This compression, though great, respects all essential relations. For example, every location on these diagrams has a concrete illustration but the accidental relations of the field have been omitted; the essential relations are preserved. Each diagram is, there-

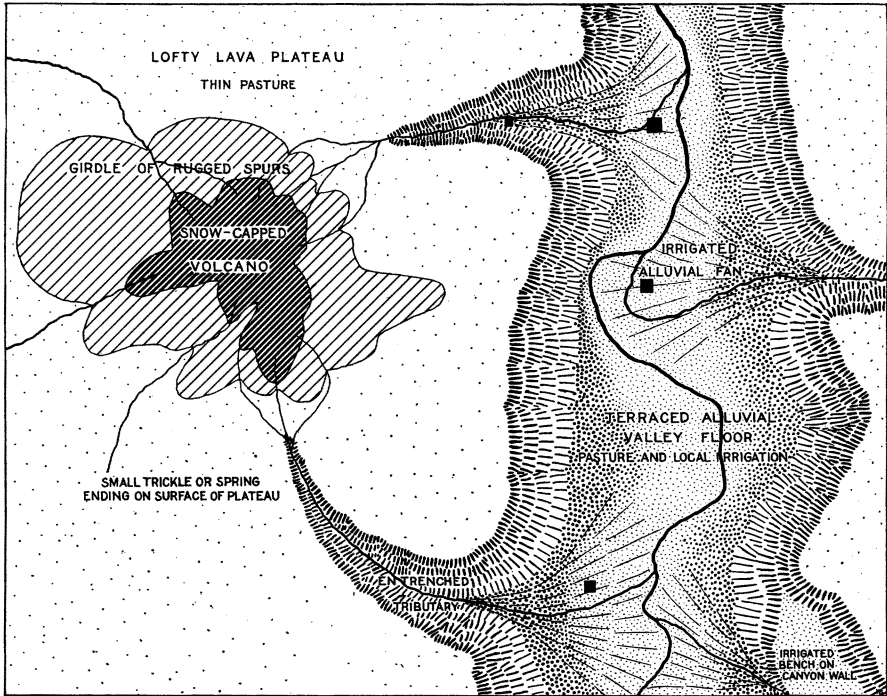


FIG. 4—Regional diagram to show the physical relations in the lava plateau of the Maritime Cordillera west of the continental divide. For location, see Fig. 2. Trails lead up the entrenched tributaries. If the irrigated bench (lower right corner) is large, a town will be located on it. Shepherds' huts are scattered about the edge of the girdle of spurs. There is also a string of huts in the deep sheltered head of each tributary. See also Fig. 5 for conditions on the valley or canyon floor.

ranged from  $4^{\circ}$  to  $20^{\circ}$  F. The thatched stone hut that we passed at 17,100 feet and that enjoys the distinction of being the highest in the world was in other respects the same as the thousands of others in the same region.

fore, a kind of generalized type map. It bears somewhat the same relation to the facts of human geography that a block diagram does to physiography. The darkest shading represents steep snow-covered country; the next lower grade represents rough but snow-free country; the lightest shading represents moderate relief; and no shading represents plain or plateau. Small circles represent forest or woodland; small open-spaced dots, grassland. Fine alluvium is represented by small closely spaced dots; coarse alluvium by large closely spaced dots.

To take an illustration. In Figure 8 we have the Apurimac region near Pasaje (see location map, Fig. 2). At the lower edge of the rectangle is a snow-capped outlier of the Cordillera Vilcapampa. The belt of rugged country represents the lofty, steep, exposed, and largely inaccessible ridges at the mid-elevations of the mountains below the glaciated slopes at the heads of tributary valleys. The villages in the belt of pasture might well be Incahuasi and Patapampa. The floors of the large canyons on either hand are bordered by extensive alluvial fans. The river courses are sketched in a diagrammatic way only, but a map would not be different in its general disposition. Each location is justified by a real place with the same essential features and relations. In making the change there has been no alteration of the general relation of the alluvial lands to each other or to the highland. By suppressing unnecessary details there is produced a diagram whose essentials have simple and clear relations. When such a regional diagram is amplified, as in this article, by photographs of real conditions it becomes a sort of generalized picture of a large group of geographic facts. One could very well extend the method to the whole of South America. It would be a real service to geography to draw up a set of, say, twelve to fifteen regional diagrams, still further generalized, for the whole of the continent. As a broad classification they would serve both the specialist and the general student. As the basis for a regional map of South America they would be invaluable if worked out in sufficient detail and constructed on the indispensable basis of field studies.



It sheltered a family of five. As we passed, three rosy-cheeked children almost as fat as the sheep about them were sitting on the ground in a corner of the corral playing with balls of wool. Hundreds of alpacas and sheep grazed on the hill slopes and valley floor, and their tracks showed plainly that they were frequently driven up to the snowline in those valleys where a trickle of water supported a band of pasture. Less than a hundred feet below them were other huts and flocks.

Here we have the limits of altitude and the limits of resources. The intervalley spaces do not support grass. Some of them are quite bare, others are covered with mosses. It is too high for even the tola bush—that pioneer of Alpine vegetation in the Andes. The distance<sup>1</sup> to Cotahuasi is 75 miles, to Antabamba 50 miles. Thence wool must be shipped by mule-back to the railroad in the one case 250 miles to Arequipa, in the other case 200 miles to Cuzco. Even the potatoes and barley, which must be imported, come from valleys several days' journey away. The question naturally arises why these people live on the rim of the world. Did they seek out these neglected pastures, or were they driven to them? Do they live here by choice or of necessity? The answer to these questions introduces two other geographic factors, the one physical, the other commercial, which we shall now examine.

The main tracts of lofty pasture above Antabamba cover mountain slopes and valley floor alike, but the moist valley floors supply the best grazing (Fig. 3). Moreover, the main valleys have been intensively glaciated. Hence, though their sides are steep walls, their floors are broad and flat. Marshy tracts, periodically flooded, are scattered throughout, and here and there are overdeepened portions where lakes have gathered. There is a thick carpet of grass, also numerous huts and corrals, and many flocks. At the upper edge of the main zone of pasture the grasses become thin and with increasing altitude give out altogether except along the moist valley floors or on shoulders where there is seepage.

If the streams head in dry mountain slopes without snow the grassy bands of the valley floor terminate at moderate elevations. If the streams have their sources in snowfields or glaciers there is a more uniform run-off, and a ribbon of pasture may extend to the snowline. To the latter class belong the pastures that support these remote people.

In the case of the Maritime Andes the great elevation of the snowline is also a factor. If, in Figure 3, we think of the snowline as at the upper level of the main zone of pasture then we would have the conditions shown in Figure 14, where the limit of general, not local occupation is the snowline, as in the Cordillera Vilcapampa and between Chuquibambilla and Antabamba.

A third factor is the character of the soil. Large amounts of volcanic ash and lapilli were thrown out in the late stages of volcanic eruption in

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<sup>1</sup> Distances are not taken from the map but from the trail.



FIG. 5—Cotahuasi on the floor of the Cotahuasi canyon. The even skyline of the background is on a rather even-topped lava plateau. The terrace on the left of the town is formed on limestone, which is overlaid by lava flows. A thick deposit of terraced alluvium may be seen on the valley floor, and it is on one of the lower terraces that the city of Cotahuasi stands. The higher terraces are in many cases too dry for cultivation. The canyon is nearly 7,000 feet deep and has been cut through over one hundred principal lava flows.

which the present cones of the Maritime Andes were formed. The coarse texture of these deposits allows the ready escape of rainwater. The combination of extreme aridity and great elevation results in a double restraint upon vegetation. Outside of the moist valley floors, with their film of ground moraine on whose surface plants find a more congenial soil, there is an extremely small amount of pasture. Here are the natural grazing grounds of the fleet vicuña. They occur in hundreds, and so remote and little disturbed are they that near the main pass one may count them by the score. As we rode by, many of them only stared at us without taking the trouble to get beyond rifle shot. It is not difficult to believe that the Indians easily shoot great numbers in remote valleys that have not been hunted for years.

The extreme conditions of life existing on these lofty plateaus is well shown by the readiness with which even the hardy shepherds avail themselves of shelter. Wherever deep valleys bring a milder climate within reach of the pastures the latter are unpopulated for miles on either side. The sixty-mile stretch between Chuquibamba and Salamanca is without even a single hut, though there are pastures superior to the ones occupied by those loftiest huts of all. Likewise there are no permanent homes between Salamanca and Cotahuasi, though the shepherds migrate across this belt in the milder season of rain. Eastward and northward toward the crest of the Maritime Cordillera there are no huts within a day's journey of the Cotahuasi canyon. Then there is a group of a dozen just under the crest of the secondary range that parallels the main chain of volcanoes. Thence northward there are a number of scattered huts between 15,500 and 16,500 feet, until we reach the highest habitations of all at 17,100 feet.

The unpopulated belts of lava plateau bordering the entrenched valleys are, however, as distinctly "sustenance" spaces, to use Penck's term, as the irrigated and fertile alluvial fans in the bottom of the valley. This is well shown when the rains come and flocks of llamas and sheep are driven forth from the valleys to the best pastures. It is equally well shown by the distribution of the shepherds' homes. These are not down on the warm canyon floor, separated by a half day's journey from the grazing. They are in the entrenched tributary valleys of Figure 4 or just within the rim of the canyon. It is not shelter from the cold but from the wind that chiefly determines their location. They are also kept near the rim of the canyon by the pressure of the farming population from below. Every hundred feet of descent from the arid plateau (Fig. 5) increases the water supply. Springs increase in number and size; likewise belts of seepage make their appearance. The gradients in many places diminish, and flattish spurs and shoulders interrupt the generally steep descents of the canyon wall. Every change of this sort has a real value to the farmer and means an enhanced price beyond the ability of the poor shepherd to pay. If you ask a wealthy *hacendado* on the valley floor (Figs. 5 and 6), who it is that live in the huts

above him, he will invariably say "los Indios," with a shrug meant to convey the idea of poverty and worthlessness. Sometimes it is "los Indios pobres," or merely "los pobres." Thus there is a vertical stratification of society corresponding to the superimposed strata of climate and land.

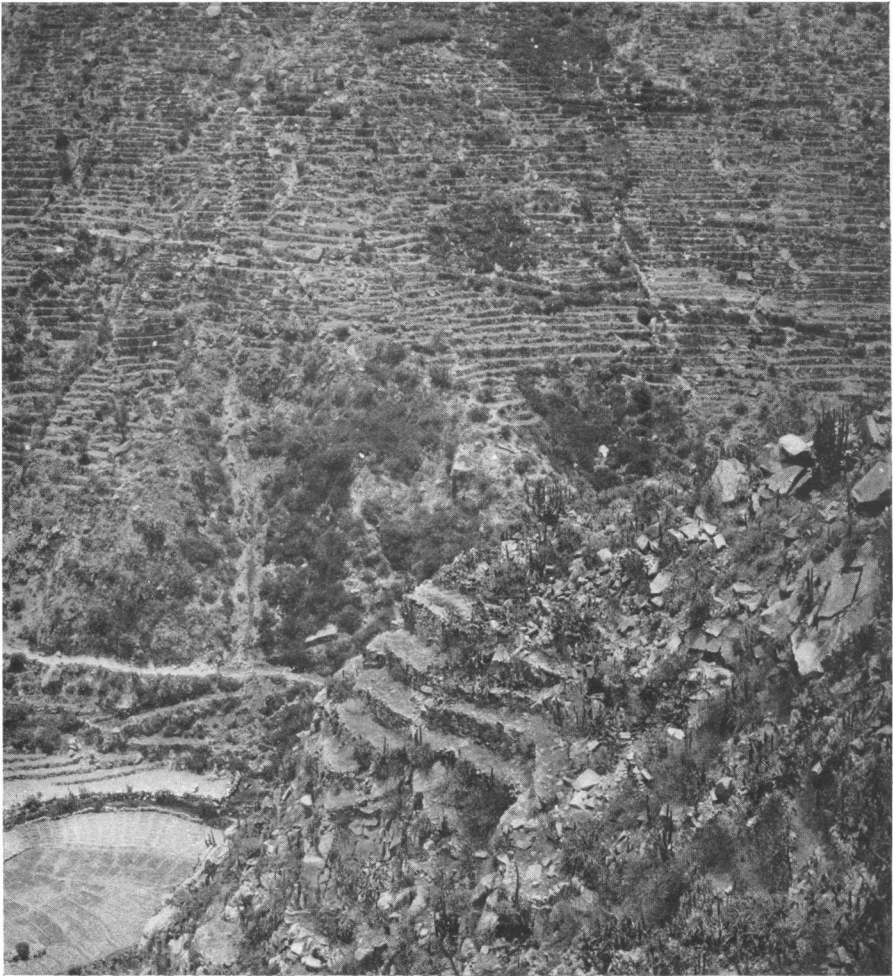


FIG. 6—Terraced hill slopes near Salamanca. There is no part of the photograph which is not covered with terraces save a few places where bushy growths are visible or where torrents descend through artificial canals.

At Salamanca (Fig. 7) I saw this admirably displayed under circumstances of unusual interest. The floor and slopes of the valley are more completely terraced than in any other valley I know of. In the photograph, Figure 6, which shows at least 2,500 feet of descent near the town, one cannot find a single patch of surface that is not under cultivation. The valley is simply filled with people to the limit of its capacity. Practically all are

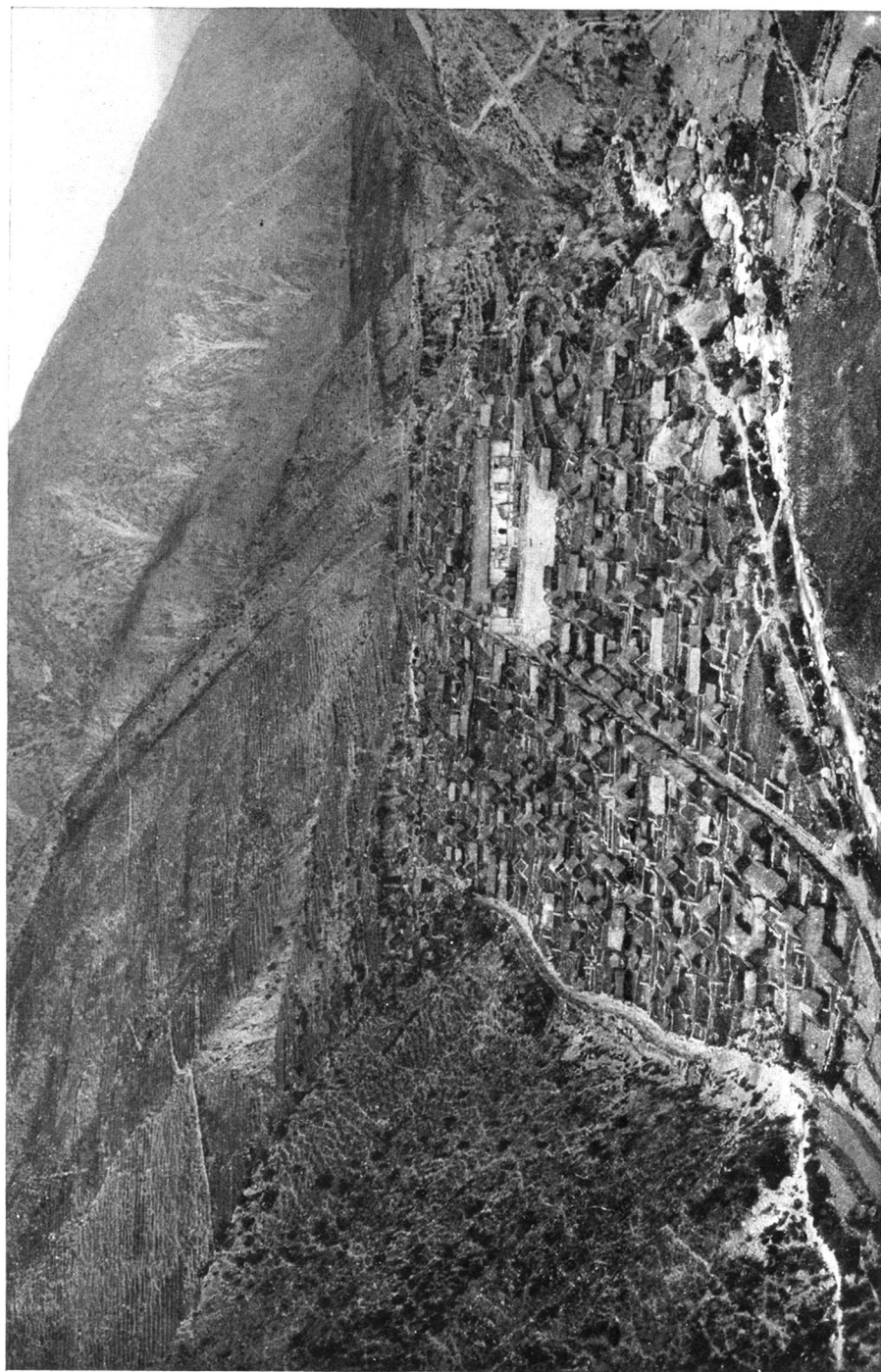


FIG. 7.—Salamanca, on the floor of the deep Arma valley, which is really a canyon above this point and which, in spite of its steepness, is thoroughly terraced and intensively cultivated up to the frost line. See also Fig. 6.

Indians, but with many grades of wealth and importance. When we rode out of the valley before daybreak, one September morning in 1911, there was a dead calm, and each step upward carried us into a colder stratum of air. At sunrise we had reached a point about 2,000 feet above the town, or 14,500 feet above sea level. We stood on the frost line. On the opposite wall of the valley the line was as clearly marked out as if it had been an irrigating canal. The light was so fully reflected from the millions of frost crystals above it that both the mountainside and the valley slopes were sparkling like a ruffled lake at sunrise. Below the frost line the slopes were dark or covered with yellow barley and wheat stubble or green alfalfa.

It happened that the frost line was near the line of division between corn and potato cultivation and also near the line separating the steep rough upper lands from the cultivable lower lands. Not a habitation was in sight above us, except a few scattered miserable huts near broken terraces, gullied by wet-weather streams and grown up to weeds and brush. Below us were well-cultivated fields, and the stock was kept in bounds by stone fences and corrals; above, the half-wild burros and mules roamed about everywhere, and only the sheep and llamas were in rude enclosures. Thus in a half hour we passed the frontier between the agricultural folk below the frost line and the shepherd folk above it.

In a few spots the line followed an irregular course, as where flatter lands were developed at unusual elevations or where air drainage altered the normal temperature. And at one place the frost actually stood on the young corn, which led us to speculate on the possibility of securing from Salamanca a variety of maize that is more nearly resistant to light frosts than any now grown in the United States. In the endless and largely unconscious experimentation of these folk perched on the valley walls a result may have been achieved ahead of that yet reached by our professional experimenters. Certain it is that nowhere else in the world has the potato been grown under such severe climatic conditions as in its native land of Peru and Bolivia. The hardest varieties lack many qualities that we prize. They are small and bitter. But at least they will grow where all except very few cultivated plants fail, and they are edible. Could they not be imported into Canada to push still farther northward the limits of cultivation? Potatoes are now grown at Forts Good Hope and McPherson in the lower Mackenzie basin. Would not the hardest Peruvian varieties grow at least as far north as the continental timber line? I believe they could be grown still farther north. They will endure repeated frosts. They need scarcely any cultivation. Prepared in the Peruvian manner, as *chuña*, they could be kept all winter. Being light, the meal derived from them could be easily packed by hunters and prospectors. An Indian will carry in a pouch enough to last him a week. Why not use it north of the continental limit of other cultivated plants since it is the pioneer above the frost line on the Peruvian mountains?

The relation between farmer and shepherd or herdsman grows more complex where deeper valleys interrupt the highlands and mountains. Figure 8 represents typical relations, though based chiefly on the Apurimac

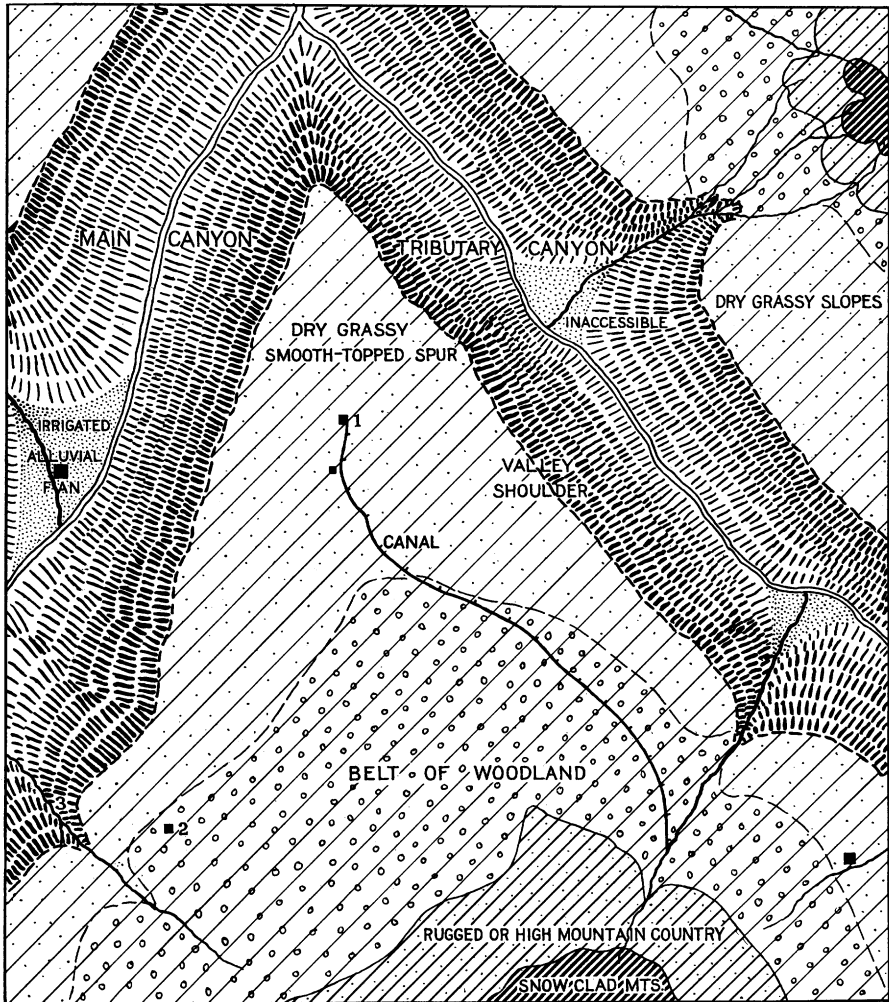


FIG. 8—Regional diagram representing the deep canyoned country west of the Eastern Cordillera in the region of the Apurimac. For photograph see Fig. 10. For further description see footnote to Fig. 3. Numbers 1, 2, and 3 correspond in position to the same numbers in Fig. 9.

canyon and its surroundings near Pasaje. First there is the snow-clad region at the top of the country. Below it are grassy slopes, the homes of mountain shepherds, or rugged mountain country unsuited for grazing. Still lower there is woodland, in patches chiefly, but with a few large continuous tracts. The shady sides of the ravines and the mountains have the



most moisture, hence bear the densest growths. Finally, the high country terminates in a second belt of pasture below the woodland.

Wherever streams descend from the snow or woodland country there is water for the stock above and for irrigation on the alluvial fan below. But

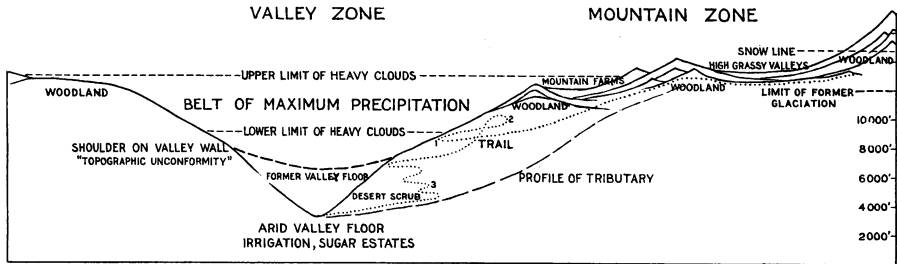


FIG. 9—Valley climates of the canyoned region shown in Figs. 8 and 10.



FIG. 10—The Apurimac canyon near Incahuasi above Pasaje. See Figs. 2 and 8. The moderate slope in the immediate foreground is repeated (a) on the summit of the dark spur on the left, (b) on the spur that interlocks with it in the center, and (c) just under the clouds on the extreme left. In contrast are the precipitous inner walls of the canyon. It is 8,000 feet from the clouds to the canyon floor.

the spur ends dropping off abruptly several thousand feet have a limited area and no running streams, and the ground water is hundreds of feet down. There is grass for stock, but there is no water. In some places the stock is driven back and forth every few days. In a few places water is brought to the stock by canal from the woodland streams above, as at Incahuasi (Figs. 2 and 8). In the same way a canal brings water to Pasaje



*hacienda* from a woodland strip many miles to the west. The little canal in the figure is almost a toy construction a few inches wide and deep and con-

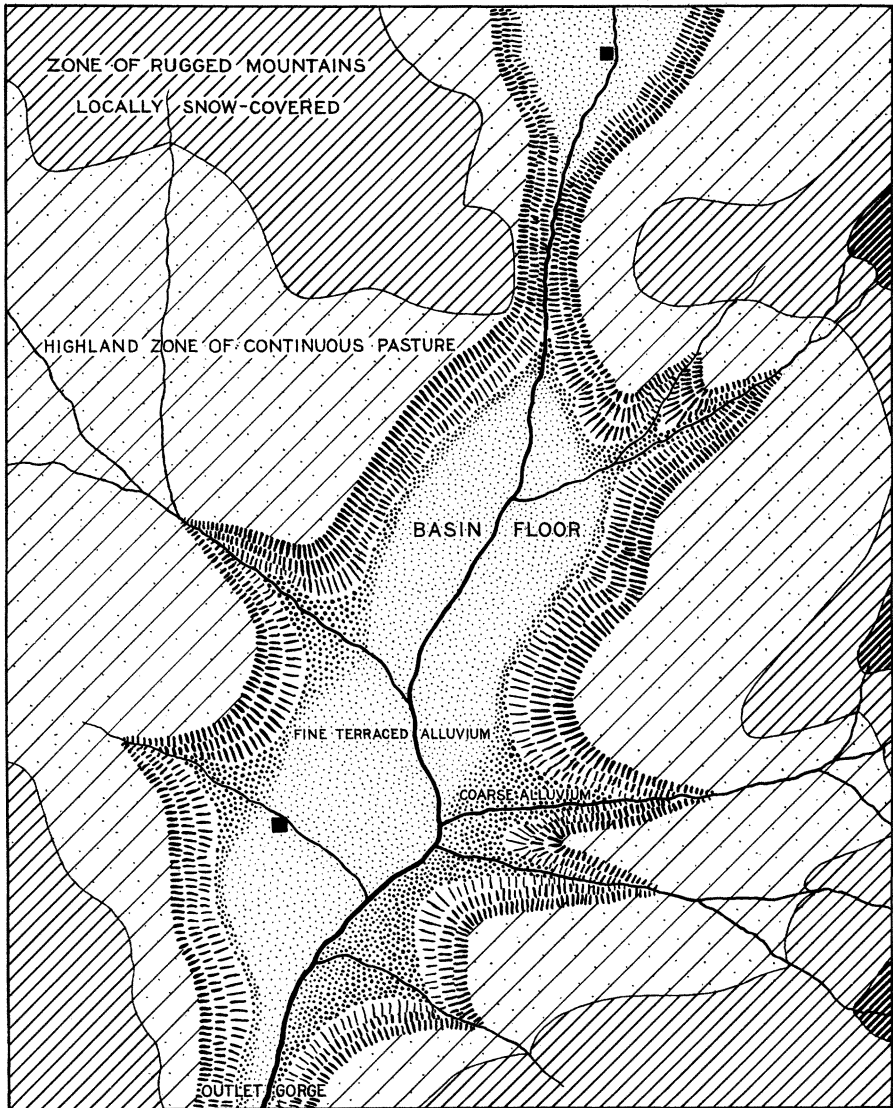


FIG. 11—Regional diagram to show the typical physical conditions and relations in an intermont basin in the Peruvian Andes. See also Fig. 13. In addition to reference to the note under Fig. 3 it should be emphasized that this is not a "map" of the Cuzco basin. While the conditions in that basin are the chief basis of the diagram, the generalization has been extended to illustrate many basins.

veying only a trickle of water. Yet on it depends the settlement at the spur end, and if it were cut the people would have immediately to repair it or establish new homes.

The canal and the pasture are possible because the slopes are moderate. They were formed in an earlier cycle of erosion when the land was lower. They are hung midway between the rough mountain slopes above and the steep canyon walls below (Fig. 10). Their smooth descents and gentle pro-

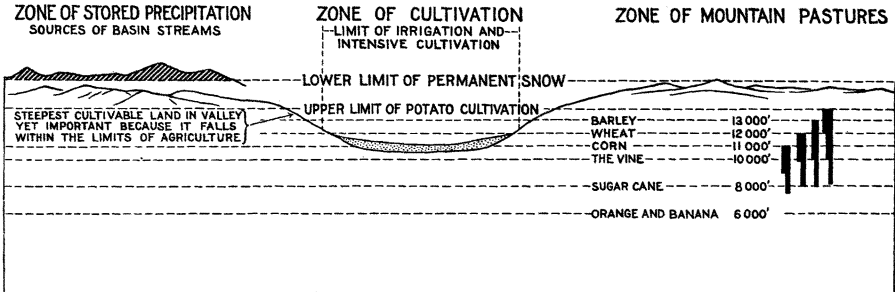


FIG. 12—Climatic cross-section showing the location of various zones of cultivation and pasture in a typical intermont basin in the Peruvian Andes. The thickness of the dark symbols on the right is proportional to the amount of each staple that is produced at the corresponding elevation.



FIG. 13—Composition of topography on the edge of an intermont basin (Cuzco). The crest of the hills is the edge of a plateau devoted to grazing. Farms and pastures are developed on the lower levels of the hillslopes in the picture. There is a border zone of coarse gravels or benchland of older strata. In the foreground is younger alluvium which forms the highly cultivated floor of the valley. See also Fig. 11.

files are in very pleasing contrast to the rugged scenery about them. The trails follow them easily. Where the slopes are flattest, farmers have settled and produce good crops of corn, vegetables, and barley. Some farmers have even developed three- and four-story farms. On an alluvial fan in the

main valley they raise sugar cane and tropical and subtropical fruits; on the flat upper slopes they produce corn; in the moister soil near the edge of the woodland are fields of mountain potatoes; and the upper pastures main-

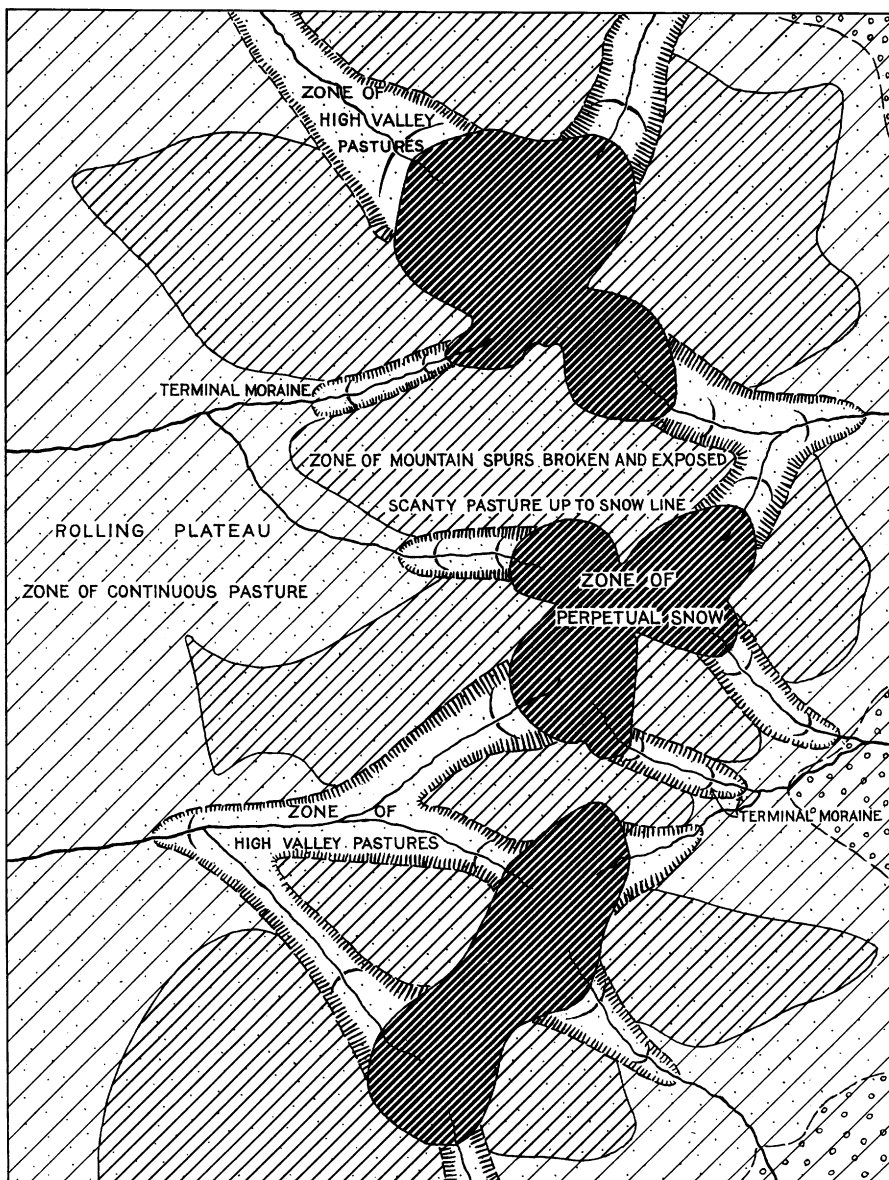


FIG. 14—Regional diagram for the Eastern Cordillera or Cordillera Vilcapampa. Note the crowded zones on the right (east and north) in contrast to the open succession on the left. In sheltered places woodland extends even higher than shown. At several points patches of it grow right under the snowline. Other patches grow on the floors of the glaciated valley troughs.

tain flocks of sheep. In one district this change takes place in a distance that may be covered in five hours. Generally it is at least a full and hard day's journey from one end of the series to the other.

Wherever these features are closely associated they tend to be controlled by the planter in some deep valley thereabouts. Where they are widely scattered the people are independent, small groups living in places nearly inaccessible. Legally they are all under the control of the owners of princely tracts that take in the whole country, but the remote groups are left almost wholly to themselves. In most cases they are supposed to sell their few commercial products to the *hacendado* who nominally owns their



FIG. 15—Looking up a spurless flat-floored glacial trough near the pass in the Cordillera Vilcapampa from 14,200 feet. Note the looped terminal and lateral moraines on the steep valley wall on the left. A stone fence from wall to wall serves to enclose the flock of the mountain shepherd.

land, but the administration of this arrangement is left largely to chance. The shepherds and small farmers near the plantation are more dependent upon the planter for supplies, and also their wants are more varied and numerous. Hence they pay for their better location in free labor and in produce sold at a discount.

So deep are some of the main canyons, like the Apurimac and the Cotahuasi, that their floors are arid or semi-arid. The fortunes of Pasaje are tied to a narrow canal from the moist woodland and a tiny brook from a hollow in the valley wall. Where the water has thus been brought down to the arable soil of the fans there are rich plantations and farms. Elsewhere, however, the floor is quite dry and uncultivated. In small spots

here and there is a little seepage, or a few springs, or a mere thread of water that will not support a plantation, wherefore there have come into existence the valley herdsmen and shepherds. Their intimate knowledge of the moist places is their capital, quite as much as the cattle and sheep they own. In a sense their lands are the neglected crumbs from the rich man's table. So we find the shepherd from the hills invading the valleys just as the valley farmer has invaded the country of the shepherd.

The basin type of topography calls into existence a set of relations quite distinct from either of those we have just described. Figure 11 represents the main facts. The rich and comparatively flat floor of the basin supports most of the people. The alluvial fans tributary thereto are composed of fine material on their outer margin and of coarse stony waste at their heads. Hence the valley farms also extend over the edges of the fans, while only pasture or dense chaparral occupies the upper portions. Finally there is the steep margin of the basin where the broad and moderate slopes of the highland break down to the floor of the basin.

If a given basin lies at an elevation exceeding 14,000 feet, there will be no cultivation, only pasture. If at 10,000 or 11,000 feet, there will be grain fields below and potato fields above (Figs. 12 and 13). If still lower, fruit will come in and finally sugar cane and many other subtropical products, as at Abancay. Much will also depend upon the amount of available water and the extent of the pasture land all about. Thus the densely populated Cuzco basin has a vast mountain territory tributary to it and is itself within the limits of barley and wheat cultivation. Furthermore there are a number of smaller basins, like the Anta basin on the north, which are dependent upon its better markets and transportation facilities. A dominance of this kind is self-stimulating and at last is out of all proportion to the original differences of nature. Cuzco has also profited as the gateway to the great northeastern valley region of the Urubamba and its big tributaries. All of the varied products of the subtropical valleys find their immediate market at Cuzco.

The effect of this natural conspiracy of conditions has been to place the historic city of Cuzco in a position of extraordinary importance. Hundreds of years before the Spanish Conquest it was a center of far-reaching influence, the home of the powerful Inca kings. From it the strong arm of authority and conquest was extended; to it came tribute of grain, wool, and gold. To one accustomed to look at such great consequences as having at least some ultimate connection with the earth, the situation of Cuzco would be expected to have some unique features. With the glorious past of that city in mind, no one can climb to the surrounding heights and look down upon the fertile mountain-rimmed plain as at an ordinary sight. The secret of those great conquests lies not only in mind but in matter. If the rise of the Incas to power was not related to the topography and climate of the Cuzco basin, at least it is certain that without so broad and noble a stage the scenes would have been enacted on a far different scale.

The first Inca king and the Spanish after the Incas found here no mobile nomadic tribes melting away at the first touch, no savages hiding in forest fastnesses, but a well-rooted agricultural race in whose center a large city had grown up. Without a city and a fertile tributary plain no strong system of government could be maintained or could even arise. It is a great advantage in ruling to have subjects that can not move. The



FIG. 16—Alpine pastures in the mountain valley, between Chuquibambilla and Lambrama. Huge stone corrals are built on either slope, sheltered from the night winds that blow down-valley.

agricultural Indians of the Andean valleys and basins, in contrast to the mobile shepherd, are as fixed as the soil from which they draw their life.

The full occupation of the pasture lands about the Cuzco basin is in direct relation to the advantages we have already enumerated. Every part of the region feels the pressure of population. Nowhere else in the Peruvian Andes are the limits between cultivation and grazing more definitely drawn than here. Moreover, there is today a marked difference between the types that inhabit highland and basin. The basin Indian is either a debauched city dweller or, as generally, a relatively alert farmer.

The shepherds are exceedingly ignorant and live for the most part in a manner almost as primitive as at the time of the Conquest. They are shy and suspicious. Many of them prefer a life of isolation and rarely go down to the town. They live on the fringe of culture. The new elements of their life have come to them solely by accident and by what might be called an ethnic process of seepage. The slight advances that have been made do not happen by design, they merely happen. Put the highland shepherd in the basin and he would starve in competition with the basin type. Undoubtedly he would live in the basin if he could. He has not been driven out of the basin; he is kept out.

And thus it is around the border of the Abancay basin and others like it. Only, the Abancay basin is lower and more varied as to resources. The Indian is here in competition with the capitalistic white planter. He lives on the land by sufferance alone. Farther up the slopes are the farms of the Indians and above them are the pastures of the ignorant shepherds. Whereas the Indian farmer who raises potatoes clings chiefly to the edge of the Cuzco basin where lie the most undesirable agricultural lands, the Indian farmers of Abancay live on broad rolling slopes like those near the pass northward toward Huancarama. They are unusually prosperous, with fields so well cultivated and fenced, so clean and productive, that they remind one somewhat of the beautiful rolling prairies of Iowa.

It remains to consider the special topographic features of the mountain environments we are discussing, in the Vilcapampa region on the eastern border of the Andes (Fig. 14). The Cordillera Vilcapampa is snow-crested, containing a number of fine white peaks like Salcantay, Soray, and Soirococha (Fig. 2). There are a large number of small glaciers and a few that are several miles long. There was here in glacial times a much larger system of glaciers which lived long enough to work great changes in the topography. The floors of the glaciated valleys were smoothed and broadened and their gradients flattened (Fig. 15). The side walls were steepened and precipitous cirques were formed at the valley heads. Also, there were built across the valleys a number of stony morainic ridges. With all these changes there was, however, but little effect upon the main masses of the big intervalley spurs. They remain as before—bold, wind-swept, broken, and nearly inaccessible.

The work of the glaciers aids the mountain people. The stony moraines afford them handy sizable building material for their stone huts and their numerous corrals. The thick tufts of grass in the marshy spots in the overdeepened parts of the valleys furnish them with grass for their thatched roofs. And, most important of all, the flat valley floors have the best pasture in the whole mountain region. There is plenty of water. There is seclusion, and, if a wall be built from one valley wall to another, an entire section of the valley may be enclosed, and with little labor. A village like Choquetira, located on a bench on the valley side, commands an extensive

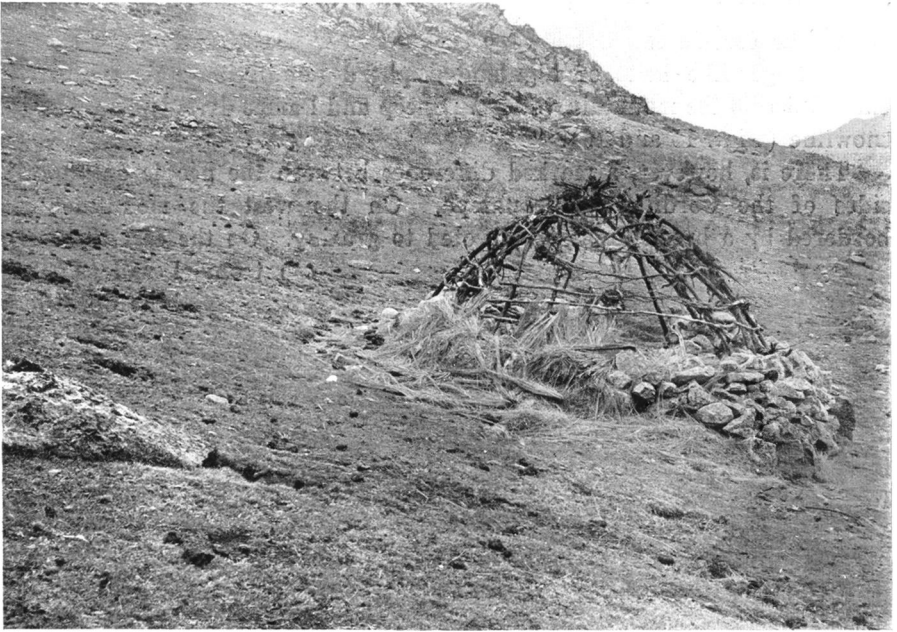


FIG. 17.



FIG. 18.

FIG. 17—Shepherds' shelter hut near Chuquibambilla. Elevation just under 16,000 feet. Contrast with Fig. 16 and Fig. 5.

FIG. 18—Village at head of alluvial fan near Lambrama. This relation of town to alluvial fan is typical of a large part of the Peruvian Andes. Above are the mountain pastures; below are the better farms of the valley and basin planters. See Fig. 16 for the grazing country. Elevation 10,600 feet.



view up and down the valley—an important feature in a grazing village where the corrals can not always be built near the houses of the owners. Long, finger-like belts of highland-shepherd population have thus been extended into the mountain valleys. Sheep and llamas drift right up to the snowline (Figs. 15 and 16).

There is, however, a marked difference between the people on opposite sides of the Cordillera Vilcapampa. On the west the mountains are bordered by a broad highland devoted to grazing. On the east there is a narrower grazing belt leading abruptly down to tropical valleys. The eastern or leeward side is also the warmer and wetter side of the Cordillera. The snowline is several hundred feet lower on the east. The result is that patches of scrub and even a little woodland occur almost at the snowline in favored places. Mist and storms are more frequent. The grass is longer and fresher. Vegetation in general is more abundant. The people make less of wool than of cattle, horses, and mules. Vilcabamba pueblo is famous for its horses, wiry, long-haired little beasts, as hardy as Shetland ponies. We found cattle grazing only five hundred feet below the limit of perpetual snow. There are cultivated spots only a little farther down, and only a thousand feet below the snow are abandoned terraces. At the same elevation are twisted ghenigo trees, at least two hundred years old, as shown by their rings of growth. Thus the limits of agriculture are higher on the east; likewise the limits of cattle grazing that naturally goes with agriculture. Sheep would thrive, but llamas do better in drier country, and the shepherd must needs mix his flocks, for the wool which is his chief product requires transportation and only the cheap and acclimated llama is at the shepherd's disposal. From these facts it will be seen that the anthropogeographic contrasts between the eastern and western sides of the Cordillera Vilcapampa are as definite as the climatic and vegetal contrasts. This is especially well shown in the difference between dry Arma, deep-sunk in a glaciated valley west of the crest of the mountains, and wet Puquiura, a half-day's journey east of the crest. There is no group on the east at all comparable to the shepherds of Choquetira, either in the matter of thorough-going dependence upon grazing or in that of dependence upon glacial topography.

Topography is not always so intimately related to the life of the people as here. In our own country the distribution of available water is a far greater factor. The Peruvian Andes therefore occupy a distinctive place in geography since, more nearly than in most mountains, their physical conditions have typical human relations that enable one clearly to distinguish the limits of control of each feature of climate or relief.

The emphasis has been kept upon topographic controls, though it has not always been possible or desirable to detach these from their intimate associations with the leading climatic factors of temperature and rainfall.